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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. LXXXIII.

I. SCHMIDEL'S PUBLICATION OF THELYPTERIS

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(Plate 179.)

Since various Old World and some American botanists have objected to the taking up of *Thelypteris* Schmidel, Icon. Pl. ed. 2: 45, tt. 11 and 13 (1762) in place of *Dryopteris* Adans. Fam. Pl. ii. 20, 551 (1763), as interpreted by Kuntze, Underwood and Christensen, we ought, perhaps, to explain the reasons for holding to *Thelypteris*. And since there is impending a botanical congress at which nomenclatural questions may be discussed and decided, we permit ourselves the hope that a restatement of the case may lead to some definite and desirable result.

Woynar (Hedwigia, lvi. 385, footnote (1916)), followed by Schinz and Thellung (Vierteljahrsschr. der Naturforsch. Gesellsch. Zürich, lxvi. 257 (1921)), has argued that Schmidel was not proposing a new genus, but merely applying the name *Thelypteris* Ruppius; that the "primary element" of Ruppius's genus was *Pteris aquilina* L.; that this species must, therefore, be regarded as the type of *Thelypteris* Schmidel, which thus becomes a mere synonym of *Pteris* L. The argument is based on Schmidel's discussion of the proper systematic position of *Thelypteris palustris non ramosa* of Ruppius, in his preface (3rd page; the pages are not numbered), and particularly on the remark that the plant "vera existat species Thelipteridis si hujus character in seminibus sub margine reconditis ponitur" ("stands as a true species of *Thelypteris*, if its character consists in the hiding of the seeds under the margin").

Woynar may be, and in all probability is, correct as to his premises. But the purely historical method of typification by which he arrives at his conclusion is nowhere sanctioned by the International Rules and seems to be discouraged by the examples given under Art. 45. It is, moreover, essentially a violation of the rule that botanical nomenclature of the vascular plants begins with 1753 (Art. 19). Pre-Linnean literature must often be consulted to determine identities; but the *names* in it have now no legal standing, and to use them, as Woynar does, as strict name-bringing synonyms, is simply to ignore 1753 as a point of departure. It may be granted that Schmidel was not seeking to establish a new genus, but only to select from generic names already available one which could be properly applied to the plant he had in hand. But, having made his selection and applied his name, for the first time after 1753, to a single unmistakable species, with which no other is mentioned as congeneric, he thereby fixed the correct use of the name for subsequent authors; and he ought to be followed, regardless of where in pre-Linnean literature he got the name and in what sense the original author had used it.

Woynar (l. c.) further remarks, incidentally, that the priority of *Thelypteris* is very questionable ("höchst fräglich"). But he gives no evidence whatever in support of his statement, and, so far as we know, neither he nor anyone else has ever given any. It is the universal and proper custom to hold the dates on botanical title-pages innocent of deception until proved guilty; in default of proof, Schmidel's 1762 must be taken at its face value.

Nakai (Bot. Mag. Tokio, xl. 61 (1926)) argues that, though Schmidel's "figures are so good as no one can make a mistake with other than *Dryopteris Thelypteris* . . . no generic character [is] given in the description. Explicatio figurarum suffixed is the explanation of the figures which is designated by him as '*Thelypteris palustris non ramosa.*' So his *Thelypteris* could not be considered as a generic name, but simply as a vague significance of a group of plants." Mackenzie (Amer. Fern. Journ. xvii. 117 (1927)), developing this line of attack (at which he appears to have arrived independently) concludes that *Thelypteris* is a sort of Latin vernacular term, strictly equivalent to the English "marsh fern," and an example of the uninomial nomenclature expressly forbidden by the International Rules (Art. 54, par. 2).

It appears to us that these authors, in stating that Schmidel did not distinguish between genera and species and that he gave no generic description, have not given sufficient weight to Schmidel's preface. The passages concerned are too long to quote; but to anyone who will take the trouble to conquer his rather involved Latin, it should be plain that Schmidel understood very clearly the difference between species, genera, and larger groups, and that he not only used his names in a generic sense, but spent much pains in choosing such as would apply correctly to the plants he was illustrating. One is not thus particular about vernacular appellations, Latin or otherwise.

As to generic description, there is a phrase of it in the passage from the preface quoted at the end of our second paragraph. It is informal and even tentative (Schmidel was evidently not wholly sure of his ground), and it is not a correct definition of *Dryopteris* as now understood. It is, however, accurate enough for the single species with which Schmidel was dealing, in which at least the young sori are commonly covered by the reflexed margins of the pinnules; and it may be held to fulfill technical requirements.

In any case, description in words is not always essential for generic publication. Art. 38 of the International Rules, indicating methods of publishing (or rather not publishing) genera, refers back to Art. 37, where specific publication is discussed. Art. 37 consists chiefly of negatives; the one positive definition is as follows: "Plates accompanied with analyses are equivalent to a description; but this applies only to plates published before January 1, 1908." Schmidel had two plates, one showing the habit of the plant, the other (our Pl. 179) giving in exquisite detail the analyses: enlargements of pinnae to show venation, young indusia and mature sori, magnified indusia, sporangia and spores, all so good that, as Nakai says, no one can mistake the plant for anything but *Acrostichum Thelypteris* L. The fact, noted by Nakai, that the habital plate (the other has no caption whatever) is "designated .. *Thelypteris palustris non ramosa,*" appears not to be important. It is difficult to illustrate a genus without also illustrating at least one of its component species; and where, as in this case, there is only one, the line between generic and specific diagnosis becomes hard to trace.

It would appear, then, that by the statements of the International Rules, *Thelypteris* was properly published.

It will be noted, and may not be without significance, that there

is a considerable lack of unanimity among the objectors to *Thelypteris*. Woynar and Schinz and Thellung find nothing wrong with its publication; Nakai and Mackenzie find nothing wrong with its typification. Each group accepts without question what the other rejects.

It may be added that *Thelypteris* was used by Schott in his splendid redefinition of the genera of ferns (Gen. Fil. ad t. 10) in the strict sense of Schmidel for the immediate group of the marsh fern; was taken up by Miss Slosson in Rydberg, Fl. Rocky Mts. 1043 (1917) to cover *Dryopteris* subgenus *Lastrea* of Christensen; and in the larger sense, as the equivalent of *Dryopteris* of Christensen, was revived by Nieuwland (Am. Midl. Nat. i. 226 (1910)) and again by Weatherby (RHODORA, xxi. 174, 177 (1919)).

Dryopteris has been much discussed, but, for the sake of completeness of statement, it may be worth while to go over again some of the well-trodden ground. Adanson's description, as compiled from the headings of his tabular synopsis, is as follows: "Paquets de fleurs Ronds, disposés sur 2 rangs sous chaque division des feuilles. Enveloppe enparasol. Globules environnés d'un anneau élastique." Only the phrase "enveloppe enparasol" applies exclusively to *Dryopteris;*[1] it is therefore, in a strict sense, its diagnosis, *i. e.* the character by which alone *Dryopteris* is to be distinguished from other genera to which the other characters given also apply.

For the rest, we can do no better than quote Nakai. "By 'enparasol' one could be easily led to consider it as *Aspidium* [as limited by Diels] or *Polystichum;*" and Nakai goes on: "H. W. Schott used *Dryopteris* also in 1834, and A. Gray in 1856 [actually 1848]. Since then it had been long neglected till O. Kuntze applied it in 1891. Kuntze's combinations are often too much even for a generous botanist; hence *Dryopteris* would have been buried eternally in the dust of synonyms if Dr. Christensen had not picked it again and made the laborious combinations in his Index Filicum." Nakai then goes on to show that, when it came to naming specimens, Adanson had no clear conception of *Dryopteris* such as that of Christensen and that the phrase "enveloppe enparasol" was sometimes properly used by him, since in his herbarium there are included in *Dryopteris* 5 species with shield-shaped indusia, nowadays put into *Polystichum;* but more often not, since 8 other species included were *Dryopteris* of Christensen, and the remainder belonged in six other

[1] "paquets de fleurs Ronds . . ," for instance, covers also *Filix* and *Polypodium*.

genera, such as *Asplenium*, *Athyrium*, and *Cystopteris*. How much more definite is Schmidel's *Thelypteris*, beautifully illustrated by analyses the identity of which cannot be doubted![1]

Mackenzie (l. c. 121), arguing against the "strained" interpretation[2] of "enparasol" as peltate, maintains that by this phrase Adanson intended only to differentiate the more or less rounded indusium of this genus from the more or less elongated, valve-like indusium of other genera. This appears to us improbable. Adanson had already, in the preceding column of his tabular arrangement, made the contrast between "longs" or "ovales" and "ronds" sori; it is not likely that he would immediately repeat it for the indusia. "En parasol," "like an umbrella," is actually paired with "en auvent," "like a pent-house" or shed—a vivid enough simile for a laterally attached indusium—and Adanson included under the latter heading a genus (his *Filix*) with sori described as round. That is, he was contrasting indusia opening on one side with indusia opening all around, without regard to shape.

It may be, and has been, better argued that Adanson, like other botanists of his time, had not perceived the distinction between peltate and reniform indusia—a difference apparently first pointed out by Roth in 1799. This is undoubtedly true. The fact remains, however, that in describing his mixture of indusial forms, he used a phrase which, if taken at all literally, can mean only peltate—as Davenport remarks, "no one has ever known a parasol to have its handle otherwise than in the center, or to have its rim divided"—and that the single species which he cited does not have such an indusium. It was largely because of this discrepancy that Davenport (RHODORA iv. 163 (1902)) rejected *Dryopteris* and was followed therein by the editors of the seventh edition of Gray's Manual. And at least one pteridologist, Dr. J. B. Kümmerle of Budapest, takes the matter so seriously, that he follows[3] Adanson's description in prefer-

[1] Incidentally, we cannot accept Nakai's argument that since a plurality of the species referred by Adanson in his herbarium to *Dryopteris* have reniform indusia, the name may properly be used for the group so characterised, under Art. 45 of the International Rules. The provision of that article that, when a genus is divided, the name should go with the group containing the larger number of species can hardly be intended to apply to unpublished determinations of herbarium specimens, unknown to anyone but the maker of them. It refers only to published references of species to given genera. On the basis of publication, *Dryopteris*, like *Thelypteris*, was originally a genus of one species.

[2] It will be noted that Nakai, otherwise in agreement, finds it natural enough.

[3] See, for instance, Ann. Mus. Nat. Hungar. xxiv. 90 (1926) and Magyar Tudományos Akademia Balkán-kutatásainek, iii. 206–207 (1926).

ence to his citation of a representative species, and applies the name *Dryopteris* to *Polystichum* of Christensen, retaining *Nephrodium* for *Dryopteris* of Christensen.

Yet when, at Brussels in 1910, Harms proposed to conserve in place of *Dryopteris* the name *Nephrodium* Richard (1801 and 1803) which had much longer and more extensive use (in such general and standard works as Hooker and Baker's *Synopsis Filicum* and Diels's masterly treatment in *Die Natürlichen Pflanzenfamilien*) his proposition was voted down and by inference, at least, the misbegotten name *Dryopteris* was not ruled out. The name *Thelypteris* did not enter into the discussion, but surely if, as the Brussels Congress ruled, the nomenclature of the *Pteridophyta* must begin with the *Species Plantarum*, 1753 (not with Christensen's *Index Filicum* in 1906), we are obliged to take up *Thelypteris* Schmidel. To have to resuscitate it, with the ultimate necessity of scores or hundreds of new combinations, is undoubtedly a misfortune; but is no greater misfortune than was the exhumation of the equally disused *Dryopteris* from "the dust of synonyms," with the resultant 500 new combinations of the *Index Filicum* alone.

To sum up: By refusing to conserve *Nephrodium*, the Brussels Congress left the field open to the operation of the rule of strict priority. The priority of *Thelypteris* over *Dryopteris* has not been effectively questioned. Its publication is not perfect in form (as might be expected in a work first published in 1742 and only revised in 1762), but it appears to us adequate, and it is careful and accurate in substance. The publication of *Dryopteris* is correct enough in form, but careless and inaccurate in substance, so much so that diversity in its use exists. At worst, *Thelypteris* has claims enough to weigh on the consciences of careful followers of the rules; if *Dryopteris* is to be retained, with a clear title, it must be conserved by a botanical congress.

EXPLANATION OF PLATE 179

Schmidel's analytical details of THELYPTERIS, from Schmidel, Icon. Pl. ed. 2, t. 13 (1762).

II. A STUDY OF THELYPTERIS PALUSTRIS

M. L. Fernald.

(Plate 180.)

In our current manuals the Marsh Fern, which has been passing variously as *Aspidium Thelypteris* (L.) Sw., *Dryopteris Thelypteris* (L.) Gray or *Thelypteris palustris* (Salisb.) Schott, is distinguished from its closest relatives by the forking veins of the segments or pinnules of the fertile pinnae. Thus, in Gray's *Manual* the species, as *Aspidium Thelypteris*, is distinguished in the key from *A. simulatum* Davenp. merely by "Fertile veins once forked" and in the fuller description emphasis is placed on "*veins forked*, bearing the . . . fruit dots near their middle; indusium minute, smooth and naked;"[1] similarly in Britton & Brown's *Illustrated Flora* we find *Dryopteris Thelypteris* keyed out by "Veins once or twice forked," with the illustration clearly showing this point and the fuller text saying "veins regularly once or twice forked; . . . indusia small, glabrous."[2]

The essential identity of these American accounts of the venation of the fertile segments and the descriptions in European floras is striking. For example, in such an authoritative European work as Moore's *Nature-Printed British Ferns* we find the genus *Lastrea* in Great Britain broken into two sections, *Lastrea* § *Dryopteris* and *Lastrea* § *Thelypteris*, the latter section including *L. Thelypteris* and characterized by "*Veins usually forked, both branches* (*anterior and posterior venules*) *fertile;*"[3] while Moore's print from a fertile pinna shows the forking veins highly developed in all the median segments. Similar descriptions and illustrations of the venation of the fertile segments are found in all other detailed accounts of the European plant and the European specimens at hand clearly show many of the lateral veins of the fertile segments or pinnules to be forked (fig. 1). In fact, an actual count of the lateral veins of the anterior half of typical median *fertile* segments from median pinnae give a range of variation in the European plant as follows: from 2 forking and 4 simple to 7 forking and 3 simple, with an average of 4 veins forking and 4½ simple.

In northeastern America, however, from Newfoundland across

[1] Robinson & Fernald, in Gray, Man. ed. 7: 41 (1908).
[2] Maxon in Britton & Brown, Ill. Fl. ed. 2, i. 18, fig. 38 (1913).
[3] Moore, Nat.-Pr. Brit. Ferns (Octavo), i. 163, t. xxix (1859).

southern Canada as far west as southeastern Manitoba and south across the northern states to Georgia, Tennessee and Oklahoma, it is difficult to find true fertile segments of our Marsh Fern with many forking veins. In sterile fronds the veins are mostly forking and so they are, also, in sterile segments (particularly the basal ones) of fertile fronds; but, when median and well-developed segments of median fertile pinnae of the plant of northeastern America are examined, it will be found that the veins of their anterior halves are usually all or nearly all quite simple (fig. 7). Actual count in more than 200 numbers examined shows a range as follows: from 0 forking veins and 4 to 8 simple ones up to 3 forking and 7 simple, with an average of ½ a vein forking and 6 simple.

This tendency of the fertile segments of the Marsh Fern of northeastern America to have few forking veins but more numerous simple ones, although overlooked by most modern botanists, was clearly recognized by those early students of our flora who were unembarrassed by a large number of European specimens and unprejudiced by the very uniform descriptions of the European plant. Thus, on the label of his specimen from Essex County, Massachusetts, William Oakes wrote, a full century ago, "the lowest pair of veins only is most commonly forked, frequently *one* of the lowest veins only is forked, often a pair and a half or *two* of the lowest pairs are forked." Again, the masterly American phytographer, John Torrey, working with New York specimens, correctly described them in his *Flora of the State of New York*, as having "veins mostly simple, sometimes forked;"[1] and the late Charles Faxon, a modest but unusually keen observer, drawing the plate[2] of *Aspidium Thelypteris* for Eaton's *Ferns of North America* and showing "the common form in New England," gave diagrams of the venation: the sterile pinna with most of the veins forked, the fertile pinna with them mostly unforked below the indusia. Lastly, on a Rhode Island sheet from Professor J. F. Collins, I find the following comment: "lower veins of pinnules *forked*, occasionally some others; but most of them simple." But, for the most part, the makers of modern descriptions of the plant of northeastern America have found the descriptions of the European plant more convenient to copy and the result is, that, by emphasis upon a character rarely found in the American

[1] Torr. Fl. N. Y. ii. 497 (1843).
[2] C. E. Faxon in Eaton, Ferns N. A. ii. t. 30 (1879).

plant, the real distinctions between our *Thelypteris palustris* and the endemic American *T. simulata* (Davenp.) Nieuwl. are rendered unnecessarily doubtful. The key-character now found in our manuals should be greatly modified and the following substitute is proposed:

T. PALUSTRIS. Lateral nerves of the segments of the *sterile* fronds mostly forked, of the fertile simple or forked: indusia glabrous or coarsely glandular-toothed or long-ciliate.

T. SIMULATA. Lateral veins of the segments of both sterile and fertile fronds simple: indusia minutely glandular-ciliate.

Although the plant of northeastern America has the venation of the fertile pinnae much simpler than in typical European material, we have in the extreme southeastern states and in Bermuda a plant with veins quite as generally forked as in the European. All the material I have seen from Louisiana, Florida and Bermuda has most of the veins of the fertile pinnae forked (fig. 5). This material shows a range of variation as follows: from 3 forking veins and 6 simple ones to 6 forking and 2 simple, with an average of 4 forking and 4 simple, an average not very unlike that of the European series. Some plants, with several forking fertile veins occur northward to southeastern Pennsylvania and occasional individuals from further north have a few fertile segments with numerous forking veins. But north of Louisiana and Florida the species certainly shows a general reduction in the number of forked veins. Typical segments of three of these plants, the European (fig. 1), the northeastern American (fig. 7) and the southeastern American (fig. 5) are shown in the outline drawings prepared by Miss Ethel C. Dansie.

The descriptions of the indusia in American manuals and in European handbooks are so different that, coupled with the difference in venation already discussed, they might very naturally be taken as characterizing distinct European and northeastern American species. The statements in Gray's *Manual* and in Britton & Brown's *Illustrated Flora* have already been quoted: "indusium minute, smooth and naked" and "indusia small, glabrous." Such characterizations are typical in America; and when we turn to European descriptions and illustrations we likewise find a remarkable uniformity of statement, but one seemingly incompatible with the American. Thus, the analytical drawings published by Schmidel[1] (see PL. 179) with his original account of *Thelypteris* show the indusia with coarse gland-tipped teeth; and in his description Schmidel strongly emphazised

[1]Schmidel, Icones Plantarum, ed. 2, t. xiii (1762).

them: "Quandiu peltae iuniores et vegetae adhuc sunt, apicibus lacinularum, non quidem omnium in omnibus, plurimarum tamen, inhaerere solent globuli parui, crocei dilutioris coloris, propter succum quem continent viscidulum splendidi. Ex his vnus post alterum sensim euanescunt, postquam ad aliquod tempus durauerunt." Similarly, in the very clear analytical plate in his incomparable *Kryptogamische Gewächse*, Christian Schkuhr showed the characteristic European plant with practically all the fertile veins forking and with the indusia bearing conspicuous glands at the tips of the coarse teeth: "Die Fruchtdecken . . . sind am Rande mit gestielten Drüsen besetzt."[1] Or, again, in Moore's *Nature-Printed British Ferns*, already referred to, the illustration brings out the glandular ciliation and the text emphasizes it: "*Indusium* a small delicate roundish-reniform membrane, . . . the free margin lacerate and glandular"; and Luerssen goes still farther, describing not only the gland-tipped teeth, but also glands between the teeth and longer unicellular hairs occurring irregularly on the indusia.[2] When the young and unshrivelled indusia of the European plant (fig. 2) are examined they are found to agree perfectly with the best European descriptions, in having coarse teeth tipped by conspicuous yellow or orange glands and only rarely (in a single collection seen by me, of *Dryopteris Thelypteris*, forma *Rogaetziana* (Bolle) Holmberg) do they have the very long cilia described by Luerssen. This European type, with fertile veins mostly forking and with indusia with coarse gland-tipped teeth, extends southward to the Mediterranean and eastward to India and southern China.

In the plant of northeastern America, on the other hand, the indusia (fig. 8) are mostly larger than in the European type (the best-developed measuring 0.7-1 mm. in diameter) and less lacerate or long-toothed. Only rarely are they so glandular-ciliate, occasionally they have a few glands, but the great majority of them examined (from a series of fully 200 numbers) are either quite glabrous and without ciliation or glabrous on the back and ciliate with few to many long slender trichomes. It is clear, then, that, although strikingly similar in aspect to European *Thelypteris palustris*, the

[1] Schkuhr, Krypt. Gew. 52, t. 52 (1809).

[2] "am Rande unregelmässig kurz-lappig bis stumpf-zähnig und auf der Spitze der Lappen oder Zähne sowie auch zwischen denselben mit kurzen, cylindrisch-keuligen bis keulenförmigen drüsigen Härchen und dazwischen längeren pfriemenförmigen, einzelligen Haaren in sehr wechselndem Verhältniss besetzt."—Luerrsen, Farnpfl. 364 (1889).

plant of northeastern America differs from it in having the veins of the fertile pinnae usually simpler and the larger indusia rarely so glandular-ciliate but more often glabrous or long-ciliate and without conspicuous glands. In one other tendency does it show a strong departure: in commonly having the rachis (at least when young), the midribs of the pinnae and the veins (especially beneath) minutely and rather densely pubescent, the frond of the European plant being nearly or quite glabrous. The pubescence is not always conspicuous in our plant but in nine-tenths of our material it is well developed and the plant of northeastern America is obviously what was intended by the late George Lawson when he designated "the plant of Gray's Manual" as

"*Lastrea Thelypteris*, a. *pubescens*.—Frond somewhat coriaceous, densely pubescent or downy throughout."[1]

And naturally enough, though like all other such cases coming as a fresh surprise, when the venation of the fertile fronds (fig. 9) and the characters of the indusia (fig. 10) of all available material from northeastern Asia (5 collections from Manchuria and Amur) are examined, they show that the plant of Amur and Manchuria is indistinguishable from that of northeastern America. It is, furthermore, noteworthy that Christensen, studying the ferns brought back from Kamtchatka by Hultén, should have set off as "a most striking variety" the plant of South Kamtchatka: *Dryopteris Thelypteris*, "var. **kamtschatica** C. CHR. nov. var. . . . Frons longe stipitata rigida, lamina utrinque pubescente subtus squamis et glandulis destituta,"[2] with the additional comment "indusia rather large and persistent." Christensen's *D. Thelypteris*, var. *kamtschatica*, like the plant of Amur and Manchuria, is pretty clearly the same as *Lastrea Thelypteris*, var. *pubescens* Lawson. Var. *kamtschatica*, besides its pubescent and esquamose and glandless character was "especially marked by . . . , short blade; frequently the stipe is 30 cm. or more, the lamina [fertile] 10 cm. long and only 5-6 cm. wide"

[1] Lawson, Edinb. New Phil. Journ. n. s. xix. 277 (1864)—Reprinted as Syn. Can. Ferns and Fil. Pl. 21 (1864). Lawson's plant came from "Odessa, Hudson's Bay, & c." This does not mean that the fern reaches northward to Hudson Bay, as might naturally be inferred. Hudson's Bay Territories in Lawson's day embraced all the vast unincorporated and undeveloped area now called Canada from the Atlantic to the Pacific and north of the St. Lawrence and the Great Lakes. It even included "the neighborhood of Montreal, up the Ottawa River," etc. (Lippincott's Gazetteer). The Odessa of Lawson, which may be taken as the type-station, is slightly north of latitude 44° N. in Addington Co., Ontario. His "Hudson's Bay" might have been anywhere in southeastern Ontario or southwestern Quebec.

[2] Christens. in Hultén, Fl. Kamtch. and Adj. Isl. i. 38 (1927).

and it was found only in "alkaline?" soil near a hot spring. In the plant of northeastern America it is not difficult to find stipes up to 7 dm. in length and in many plants the fertile lamina is but slightly more than one-third the length of the stipe. In fact, such a collection as *Bissell & Linder*, no. 19,402 from "brackish marsh," George River, Nova Scotia, must be a very close match for the type of var. *kamtschatica;* the George River specimen preserved in the Gray Herbarium having two fertile fronds: one with stipe 37 cm. long and lamina 13 cm. long and 7.5 cm. broad, the other with the lamina 15 cm. long and 6 cm. broad.

From Christensen's observation upon the Kamtchatkan plant, above quoted, one would infer that the proportions of stipe and lamina in the eastern Asiatic and the European plants are notably different. Without a larger and better-collected representation than I have seen from Europe I am unable to say whether the northeastern American and the European plants actually differ in these points. Lawson (l. c.) said: "In the Canadian plant the outline of the frond is a little different from Scotch and Irish specimens, being less narrowed at base." The European works, to quote from Moore's detailed account again, describe the "*Stipes* as long as or longer than the leafy portion in the fertile fronds. . . . Fronds . . from four to ten inches in breadth," and the European representation before me shows the fertile lamina ranging from 0.7 to 2 dm. in width (Moore's "ten inches" would be 2.45 dm.), with stipes up to 5 dm. long. In the plant of northeastern America the stipes often reach a length of 7 dm. (probably not really different in Europe) and the fertile laminas of the more than 200 numbers before me give a range in breadth of 0.4 to 1.7 dm. (with two collections from rich calcareous meadows showing the extraordinary breadth of 1.9 dm. and 2.1 dm. respectively), the average breadth of the 200 + laminas being 10.7 dm. Whether this average is less than in Europe I cannot say; judging from European descriptions and illustrations, apparently it is.

When we turn to the plant of the southeastern United States and Bermuda, with venation (fig. 5) as in the typical *Thelypteris palustris* of Europe and western and south-central Asia, we find an indusium (fig. 6) essentially like that of the northeastern American and northeastern Asiatic *Lastrea Thelypteris*, var. *pubescens* of Lawson, with few, if any, glands but with elongate non-glandular ciliation and in

size practically like the European indusia. This southern plant, it would seem, is as closely related to the more northern American extreme as it is to the European; and in the usual abundance of long cilia on the indusia they both strongly suggest the still more austral *T. palustris*, var. *squamigera* (Schlecht.) Weatherby[1] of southern India, tropical and southern Africa and northern New Zealand. In var. *squamigera* (fig. 3) there is a greater development of broad brown scales on the lower side of the costa of the pinna than is common in the more northern plants; but small (though narrower) scales may be found on young and carefully preserved European and American specimens, and in the plants of Louisiana and Bermuda they are as abundant and nearly as broad as in African specimens. The plant of southeastern North America, however, can scarcely be referred to var. *squamigera*. Such material of the African and New Zealand plant as I have examined (only three or four of the sheets showing young indusia) has the indusia (fig. 4) with copious dorsal as well as marginal long trichomes; the southeastern American plants having the indusia essentially glabrous on the back and the frond more definitely bipinnate than in the other varieties.

Thelypteris palustris, a semi-cosmopolitan species, has, then, four strongly marked varieties which may be distinguished as follows.

T. PALUSTRIS (Salisb.) Schott, var. **typica**. *Acrostichum Thelypteris* L. Sp. Pl. ii. 1071 (1753). *Polypodium Thelypteris* (L.) Weis, Pl. Crit. Fl. Gott. 307 (1770). *P. palustre* Salisb. Prodr. 403 (1796). *Polystichum Thelypteris* (L.) Roth in Roem. Arch. ii. pt. 2: 106 (1799). *Aspidium Thelypteris* (L.) Sw. in Schrad. Journ. 1880, pt. 2: 33 (1801). *Athyrium Thelypteris* (L.) Spreng. Anleit. iii. 134 (1804). *Aspid. palustre* (Salisb.) S. F. Gray, Nat. Arr. Brit. Pl. ii. 9 (1821). *Nephrodium Thelypteris* (L.) Strempel, Fil. Berol. Synop. 32 (1822). *Lastrea Thelypteris* (L.) Bory, Dict. Class. ix. 233 (1826). *T. palustris* (Salisb.) Schott, Gen. Fil. in Obs. under t. 10 (1834). *Aspid Thelyptera* Wood, Class-Book, 459 (1845) as to name-bringing syn. *Dryopteris Thelypteris* (L.) Gray, Man. 630 (1848), as to name-bringing synonym. *Hemestheum Thelypteris* (L.) Newm., Phytol. iv. Append. xxii (1851). *Lastrea palustris* (Salisb.) J. Sm. Cat. Cult. Ferns, 56 (1857). *T. Thelypteris* (L.) Nieuwl. Am. Midl. Nat. i. 226 (1910), as to name-bringing synonym.—Fertile lamina 0.7–2.5 dm. wide, glabrous or only sparingly pubescent: scales on back of rachis and midribs lanceolate to oblong, caducous: segments of median fertile pinnae with about half the veins forking (of those of the anterior half 2–7 forking, 3 or 4 simple): indusia with coarse gland-tipped

[1] Weatherby in Johnston, Contrib. Gray Herb. no. lxxiii. 40 (1924).

teeth, only rarely with long glandular ciliation.—Great Britain, southern Norway, central Sweden, northern European Russia (Perm) and lat. about 58° in western Siberia eastward in Asia and south to northern Spain, Algiers, central Italy, the Caucasus, the Himalayas and southern China. FIGS. 1 and 2.

Var. SQUAMIGERA (Schlecht.) Weatherby in Johnston, Contrib. Gray Herb. lxxii. 40 (1924). *Aspidium Thelypteris*, β. *squamigerum* Schlecht. Adumb. 23, t. 11 (1825). *A. squamulosum* Kaulf. ex Schlecht, l. c., in syn. (1825). *Lastrea squamulosa* Presl, Tent. 76 (1836). *Nephrodium squamulosum* (Presl.) Hook. f. Fl. N. Zeal. ii. 39 (1855). *A. Thelypteris*, β. *squamuligerum* Mett. Abh. Senckenb. Naturf. Ges. ii. 112 (1855). *N. Thelypteris*, β. *squamulosum* (Presl) Hook. Sp. Fil. iv. 88 (1862). *Lastrea Fairbankii* Bedd. Ferns Brit. Ind. t. 254 (1867). *N. Thelypteris*, var. β. *squamuligerum* (Mett.) Sim, Ferns S. Afr. 180 (1892). *Dryopteris Thelypteris*, var. β. *squamuligera* [as *um*] Sim, l. c. ed. 2: 102 (1915).—Fertile lamina 0.5–1.5 dm. wide; scales of rachis and midribs reniform, suborbicular or broad-ovate, castaneous or fulvous, rather persistent: veins of median fertile pinnae mostly simple: indusia copiously long-ciliate and commonly with shorter glandular ciliation and often pilose-hirsute on the back.—India, tropical and southern Africa, northern New Zealand. FIGS. 3 and 4.

Var. **Haleana**, n. var., frondibus plerumque bipinnatis medio 0.8-2 dm. latis; pinnarum costa media squamis paleaceis obtecta, squamis ovatis obtusis castaneis vel fulvis persistentibus vel caducis, pinnularum fructiferum nerviis plerumque furcatis; indusio longe ciliato vix glanduloso.—Southeastern United States and Bermuda Islands. LOUISIANA: marshes, Alexandria, *Josiah Hale* (TYPE in Gray Herb.). FLORIDA: Palma Sola, *S. M. Tracy*, no. 6627; Deep Lake, Lee Co., *A. A. Eaton*, no. 1312; Miami, May, 1877, *A. P. Garber* (as *Aspidium unitum*); Black Point, Dade Co., *A. A. Eaton*, no. 277; Alapattah, *A. A. Eaton*, no. 1007; Biscayne Bay, *E. Palmer*, no. 652; New Smyrna, *Palmer*. BERMUDA: Pembroke Marshes, June 21, 1905, *Harshberger*, August 23, 1913, *F. S. Collins*, no. 122; Devonshire Marshes, *Brown & Britton*, no. 84. Specimens from Georgia, eastern Virginia and southeastern Pennsylvania show more simple veins and seem to indicate transition to the next. FIGS. 5 and 6.

Var. **pubescens** (Lawson), n. comb. *Lastrea Thelypteris*, α. *pubescens* Lawson, Edinb. New Phil. Journ. n. s. xix. 277—reprinted as Syn. Can. Ferns and Filic. Pl. 21 (1864). Lawson's *L. Thelypteris*, β. *glabra* likewise belongs here, but his γ. *intermedia* (judging from the locality) may be different. *Dryopteris Thelypteris*, var. *kamtschatica* C. Chr. in Hultén, Fl. Kamtch. and Adj. Isl. i. 38 (1927).—Fronds usually minutely pubescent, at least when young, on both surfaces and especially along the rachis and lower sides of the midribs, mostly without scales or when young with pale narrow caducous scales; fertile fronds 0.4–1.7 (rarely– 2.1) dm. broad; the median fertile

segments with the veins all or nearly all simple: indusia when well developed 0.7–1 mm. in diameter, glabrous or long-ciliate, rarely glandular-ciliate.—Southeastern Newfoundland and the Magdalen Islands to the Ottawa Valley, Quebec, west to southeastern Manitoba and south to Georgia, Tennessee and Oklahoma (and Texas ?); southern Kamtchatka, Amur and Manchuria. TYPE-STATION: Odessa, Addington Co., Ontario (*Lawson*). FIGS. 7–10.

Phylogenetically the typical Eurasian plant, *Thelypteris palustris*, var. *typica*, seems to be farthest removed from the other varieties, in having the indusium more glandular-toothed but less often with long glandless ciliation than in the other three varieties. In this connection it is noteworthy that the European plant is distinctly not a boreal fern, there reaching its northern limit in Perm, central Sweden, southernmost Norway[1] and Great Britain and Ireland, where, in the northern and western districts it is sufficiently local to have led Moore (in 1859) to write: "Though widely dispersed in the United Kingdom, the Marsh Fern is a comparatively rare plant, being local in occurrence . . . The only Scottish county in which there is certain information of its occurrence is Forfarshire; and the recorded habitats in Ireland are few."[2] Other localities are now known, but the main point is clear, that in Europe the species is not primarily a boreal one. In Asia too, its northwestern limit (acc. to Christensen in Hultén) is near Tobolsk, and southward it reaches Algeria, central Italy, Crimea, the Caucasus, southern Turkestan, the Himalayas and southern China. In brief, var. *typica* belongs to temperate Eurasia.

Similarly, var. *pubescens*, the almost ubiquitous Marsh Fern of eastern America, is not boreal, reaching its northern limits near the southern borders of eastern Canada and Newfoundland but extending south into the Southern States; while var. *Haleana* is in a warm-temperate to sub-tropical belt, its northernmost extension on the Bermudas, its southernmost on the Florida Keys. The other variety, var. *squamigera*, occurs in southern India, tropical and southern Africa and on the North Island of New Zealand. In all three of these varieties, the plants of tropical, subtropical and temperate regions of the Southern Hemisphere and of eastern America and northeastern Asia, the preponderance of long glandless ciliation over short glandularity of the indusia is striking and it seems probable that the original form of the species was a plant of tropical or sub-

[1] Holmb. Hartm. Handb. Skand. Fl. revised by Holmb. i. 11 (1922).
[2] Moore, Nat.-Pr. Brit. Ferns (Octavo) i. 167, 168 (1859).

tropical regions, such as vars. *squamigera* and *Haleana* and that the more northern var. *pubescens* and still more extreme var. *typica* have been of later origin.

EXPLANATION OF PLATE 180

Varieties of THELYPTERIS PALUSTRIS; outlines and venations of pinnae × 1½, outlines of indusia × 50. Figs. 1 and 2, var. TYPICA; fig. 1 from Sweden, coll. *Hugo Granvik*, fig. 2 from Bavaria, *Reinsch*, no. 398. Figs. 3 and 4, var. SQUAMIGERA, both from Natal, coll. *S. L. Abraham*, 1865–6. Figs. 5 and 6, var. HALEANA, both from the type, Alexandria, Louisiana, *J. Hale*. Figs. 7–10, var. PUBESCENS; fig. 7 from Shelburne, New Hampshire. coll. *W. Deane*, August 19, 1915, fig. 8 from Stottville, Quebec, coll. *G. G. Kennedy*, July 23, 1863, figs. 9 and 10 from Amur, coll. *S. Korshinsky*, 1891.

(To be continued)

A NEW FORM OF ERYTHRONIUM AMERICANUM.—While collecting in some swampy woods in the southeast corner of Rockport Township, Massachusetts, I found a large patch of *Erythronium americanum* much of which was the typical plant. However, many of the plants had flowers rather smaller than the average and with the inner part of the perianth a deep chestnut-brown. This plant may be designated as follows:

ERYTHRONIUM AMERICANUM Ker., forma **castaneum**, forma nov., perianthio minore, intus atro-castaneo.—Swampy woods, Rockport, Massachusetts, *L. B. Smith* 938.—LYMAN B. SMITH, Winchester, Mass.

AQUILEGIA CANADENSIS, FORMA PHIPPENII IN WORCESTER COUNTY, MASSACHUSETTS.—On May 1, 1925, while specimen hunting at Boylston, Worcester County, Massachusetts, I found in a pasture, on a shale outcrop with the common scarlet-flowered form of wild columbine, a delicate salmon-pink form, fresh flowers of which were this year sent to the Gray Herbarium and were there identified by Mr. C. A. Weatherby as *Aquilegia canadensis*, f. *Phippenii* (J. Robinson) R. Hoffman. Indications are that the station will endure many years.—EARL W. BEMIS, Worcester, Massachusetts.

TWO NEW PLANTS FROM ILLINOIS.

PAUL C. STANDLEY.

IN a collection of plants made in Richland County, Illinois, in the summer of 1928 by Robert Ridgway, and received recently at